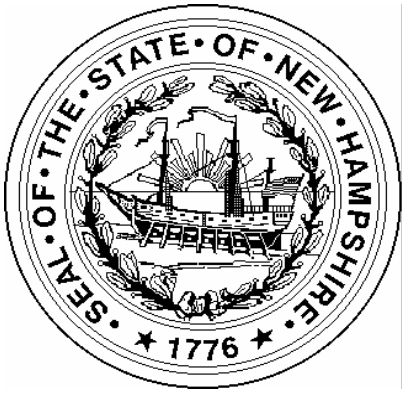

Report to the IT Council from the Data Center Consolidation Sub-Committee

Feasibility Study of Consolidating Data Centers

Version 1.0

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Acknowledgements

The consolidation sub-committee report could not have been developed without the help of many individuals from some of the States largest agencies. We would like to thank those who participated in the process for their time, knowledge and support.

The group worked hard to identify the current environment and any efficiency that could be gained by modifying it.

Many individuals and agencies made contributions to this project. The following groups deserve special thanks for making this project possible.

- Department of Health and Human Services
- Department of Administrative Services
- Department of Employment Security
- Department of Labor
- Department of Safety
- Department of Revenue Administration
- Department of Transportation
- Office of Information Technology

The participation of the commissioners and their representatives was critical to the success of the process and was greatly appreciated. The involvement of numerous representatives throughout the State would not have been possible without the support and understanding of each participant's commissioner.

1.0 Executive Summary:

The Data Center Consolidation sub-committee attempted to answer the question "What is the least expensive configuration of equipment and personnel that will support an acceptable level of service with an acceptable level of risk of failure of service availability?" To that end we worked to define a data center, identify what elements were crucial to data centers, determine under what circumstances data center consolidation was warranted and we identified the many concerns and benefits surrounding consolidation.

An inventory of existing data centers was undertaken (see Attachment A). This inventory shows the extent to which the participating agencies have developed their data centers and infrastructure. It identifies the elements of the primary data centers of these agencies and in many cases the edge locations (district and regional offices).

The committee established the criteria for evaluating the potential of data center consolidation. Following that, we polled the participating agencies to determine the appropriateness of consolidation for those centers (results see Attachment B). Not surprisingly, the two departments that currently participate in consolidated data centers, the Department of Health and Human Services and the Department of Administrative Services, indicated a willingness to maintain that status. Without exception, the remaining agencies indicated a need to maintain the current status of their data centers and offered their infrastructure for consideration for housing other agency hardware.

It was also noted that agencies intended to replace mainframe applications (thus eliminating the mainframe element of consolidation from the overall picture) and that most of the replacements will run on non-mainframe platforms. This replacement is expected to occur in most agencies over the next 3-5 years.

Agencies believed the operation of their data center is the backbone of providing quality, effective and responsive services to its customers and the public of the State of New Hampshire. It was also noted that the loss of the valuable data center resources could hinder the State's ability to maintain a high level of business continuity. All agreed that, where it was feasible, consideration of their site to host other agency needs should be made.

Three further steps were identified by the committee as being necessary to assure future opportunities for consolidation are not limited. They included the establishment of standards, the development of effective disaster recovery plans and the creation of Service Level Agreements.

2.0 Data Center Definition:

A Data Center is a repository for the storage, management and dissemination of data and information organized around a particular body of knowledge or pertaining to a particular business. Each State organization has what they consider to be a data center, although it may be referred to as a server room, computer closet or even a network operations center. A data center houses the software, hardware and network infrastructure necessary to run agency business. A data center will offer 'best-of-breed', critical infrastructure technologies resulting in a highly available, scalable, redundant, secure, manageable and flexible computer environment. Four important attributes of a good data center are *scalability*, *flexibility*, *high availability* and *Security of Data.*

Scalability:
The data center can support fast and seamless growth without major disruptions.

Flexibility:
The data center can support new services without a major overhaul of its infrastructure.

High availability:
The data center will minimize single point of failure & offer predictable uptime by incorporating concurrent maintainability and fault-tolerance against hard failures.

Security:
The data center will offer the necessary amount of security and environmental protection required by Agency, State and Federal standards.

Data Center Elements:
Data centers contain a variety of shared and in many cases essential elements. These were the elements identified by the committee.

1) Air Conditioning
2) Humidity Control
3) Uninterruptible Power Supply (UPS) large enough to provide support for all units in the data center)
4) Generator
5) Fire Suppression
6) Adequate Floor Space
7) Raised Floor
8) Facility and Data Center Security
9) Sufficient Electrical
10) Sufficient Network Connectivity

3.0 Committee Perception of Data Center Consolidation:

The perception of many sub-committee members when first organized was that all the current data centers throughout the State needed to be consolidated into one central location. After discussions it was realized that the "all into one" was not the only scenario of consolidation available.

Some more discussion did bring to light that one central data center would not be a good idea because it could create a single point of failure for the State. In addition, other topics discussed were that building one data center infrastructure would be extremely expensive as none of the existing locations are capable of being utilized for this purpose. It was also thought that this sort of arrangement may not be business friendly to meeting all the business requirements of the different agencies.

The committee did realize during this discussion that the State could achieve some savings and some significant operating advantages by consolidating the small agencies into the larger agency data centers. This of course is if the larger agency data centers could handle that expansion to accommodate the smaller agencies. The next two sections outline the concerns and benefits discussed by the committee.

4.0 Concerns of Consolidation

During our early meetings many of the participants commented on their concerns if we were to undertake any form of consolidation. The concerns expressed included:

1) One location would create a single point of failure.
2) Length of time to recover from failure.
3) Up front cost to move equipment/resources to another location, the investment into the new infrastructure and the re-coding of interfaces, Job Control Language (JCL) and code to run on a different machines
4) Security requirements of data and systems
5) Recent large investments made by each agency into the modernization of its own data center would be lost.
6) Agency belief that the operation of their data center is the backbone of providing quality, effective and responsive services to its customers and the public of the State of New Hampshire. A centralized approach that called for moving data centers would limit the ability to provide the same level of service they currently provide.
7) Higher overall cost.
8) Confidentiality of data.
9) Location of print jobs with respect to those requesting them.
10) Programmer access to code for updates, additions and changes/deletions.
11) Handling of sensitive data such as social security numbers, names, addressed, etc.
12) Handling of data backups from the perspective of the data librarians.
13) Process re-documentation task would be extensive.
14) If it isn't broken, why fix it?
15) Capacity of physical infrastructure to handle the quantity of data that needs to flow from remote locations.
16) Tape storage.
17) Federal grant requirements.
18) Lack of examples where this sort of consolidation has worked.
19) Have not been developing in a standards based environment so initial integration could be difficult. Develop long term standards to minimize this potential problem area.
20) Would need clear concise service level agreements (SLA) and memorandums of understandings (MOU).
21) Data center staff responsiveness to problems.

5.0 Benefits of Consolidation

Following our session on concerns we asked that consideration be given to the benefits of consolidation. The benefits expressed included:

1) Creation of a statewide disaster recovery plan.
2) Having a pool of staff as a resource.
3) 24 hour back-up.
4) Reduction of licenses fees.
5) Development of Standards for a data center.
6) Less equipment to maintain.
7) Larger units (servers, licenses, batteries, etc.) could be purchased at a lower cost than if you had to buy individual units to support smaller centers.

6.0 Committee Plan:

The committee was tasked with identifying evaluation criteria for consolidation that the agencies participating could use during this study as well as provide a method that the IT Council could use in the future to help determine the appropriateness of data center additions and relocations.

To this end we felt it was important to establish standards of what elements a data center should have to be considered a full scale, state of the art data center.

The following are the elements of a data center and the 8 evaluation questions that we feel would need to be examined by the IT Council when considering new/move of data centers.

Evaluation Criteria

1) Will consolidation of your agency server(s) and/or services offer justifiable cost savings?
2) Is there an existing location where equipment exists and has the capacity to accept new servers and is your location suitable to accept servers from others wishing to create or move into a data center?
3) Will consolidating server(s) and/or services into a defined location represent a single point of failure that is unacceptable to the agency and/or any business units within the agency?
4) Does the location meet the business requirements?
5) Does the State of NH own the facility?
6) Is the communication infrastructure adequate to support centralization?
7) Can the facility meet the business logistical requirements?
8) Can the facility meet the business data and physical security requirements?
9) Do federal/state mandates require specific location of data?
10) Are there unique requirements for data output management or customer fulfillment?

7.0 Methods of Consolidation:

The committee realizes that the State could achieve some savings and some significant operating advantages by consolidating the smaller agencies into the larger agency data centers. This, of course, is if the larger agency data centers could handle that expansion to accommodate the smaller agencies. The committee also realizes that if a new data center needs to be built, or a move of an existing data center needs to be done, that these are perfect times to evaluate for consolidation. The way to evaluate this is to weigh the business and state objectives against the 8 evaluation criteria outlined in Section 6.0 of this document. Should the answers to these evaluation criteria be yes, then consolidation would make sense.

8.0 Summary of the Final Recommendations from each Agency:

All participating agencies felt they have the facilities and infrastructure considered to be a large data center.

Administrative Services and the Department of Health and Human Services did not complete a survey but rather indicated that they are already consolidated in the 27 Hazen Drive Data Center. Any further consolidation that may occur for them would be from their own outlying locations into their already consolidated data center. They added that they are unable to predict potential savings that can be achieved by further consolidation. They also noted that the existing center is limited in the amount of additional servers that can be located there as that facility is currently the primary location for the addition of servers and is rapidly approaching its maximum capacity. Careful consideration will have to be given to the use of the remaining floor space and electrical capacity.

Department of Safety indicated very clearly that, due to federal and state security and confidentiality requirements and regulations that they cannot consider consolidation or moving from its current data center. They are not opposed to consolidation efforts, but cannot participate due to these regulations and the critical nature of their information.

NH Employment Security, Department Labor, Department of Transportation and Department of Revenue all completed the survey. The attached survey document (see Attachment B) outlines their responses.

In general the agencies feel they cannot consolidate their data centers into one centralized State location as in no case was it identified that it would be cost effective. Actually, most agencies projected that an increase in cost would occur. The main reason would be the up front cost to move equipment/resources to another location, the investment into the new infrastructure and the re-coding of interfaces, JCL and code to run on a different machines. It was also noted that timeline for the elimination of the larger mainframe servers in many cases is less than 5 years. Examples of this is the eminent replacement of IFS and GHRS once ERP is implemented, the current and continuing migration of the Department of Safety applications into the UNIX environment and the planned migration of the Department of Employment Security mainframe applications into Oracle. It was also identified that recent large investments made by some agencies in the modernization of their data centers would be lost.

These factors and others made it clear the participating agencies do not feel that data center consolidation would be feasible at this time. It was noted however that all agencies felt they could consider hosting smaller agencies at their data centers in some fashion, although there would be limitations. In addition, these consolidations would require agreement on a service level agreement to define the financial arrangements for the sharing of costs.

Each agency believes the operation of their data center is the backbone of providing quality, effective and responsive services to its customers and the public of the State of New Hampshire. A centralized approach that called for moving data centers would limit the ability to provide the same level of service they currently provide. All the details can be seen in the attached survey that is broken down by agency.

9.0 Next Steps:

The committee identified three important elements of data center consolidation which need to be addressed in order to facilitate future consideration.

There is an opportunity to better define future data center consolidation and growth in the area of application replacement, major application upgrades and the addition of applications. This could be obtained by establishing standards in the area of supported platforms and application infrastructure. The applications maintained in the data centers could be more effectively and efficiently supported if we could identify the most common platforms and endeavor to promote the continued use of these platforms. Failure to do so will mean a proliferation of unique infrastructure which would increase costs to train support and development staff and provide less opportunity to learn each individual piece.

Disaster recovery was a common theme and consideration throughout sub-committee sessions. While most agencies maintain backups of critical applications (and in most cases store them off-site), there are not plans for recovering from loss of a site say from a fire. A location and the hardware itself would have to be acquired before those tapes would be of any use. The determination of a multiple data center model as we are recommending here provides for an opportunity to consider some limited recovery of some sites. As more standards are introduced, the list of sites capable of supporting each other from a hardware/infrastructure perspective would grow.

Members also expressed the need to have service level agreements in place. These agreements would identify the roles and responsibilities of the partners. Currently there are limited cases where this has been done.

There is also a need to develop metrics that appropriately identify data center costs so that financial models are available when discussions on data center consolidation takes place. This is essential to answer the questions related to costs when considering requests for new data centers and moves of an existing data centers.